

# Forest Pest Management

## Pacific Southwest Region



Date: September 22, 2000  
File Code: 3420

To: District Ranger, Sierraville Ranger District, Tahoe National Forest (NE00-20)

Subject: Defoliation by white fir sawfly near Moscow Meadow

Defoliation of white fir was observed by District personnel during early August of this year. Based on the description of the defoliation provided by Steve Weaver, District Silviculturist, I determined that the likely agent was white fir sawfly. I conducted a follow-up field visit to the defoliated area on September 6, 2000. This report serves as documentation of the defoliation and is intended to provide some additional information regarding the white fir sawfly.

The area of defoliation is located north on Moscow meadow and encompasses about 900 acres (T.18N. R13E. S. 3, 4 and T.19N. R13E. S. 33, 34). The stand is composed of Jeffrey pine, ponderosa pine, and white fir. Level of defoliation ranges from light to almost 90% of the 1-year and older needles. All size classes are affected however the smaller trees (<16 in. DBH) are more severely defoliated than the larger trees. Defoliation is evenly distributed throughout the crown on the smaller trees but only about the lower 2/3's of the crowns of the larger size classes or dominant trees are affected. The area of defoliation will become less apparent as the brown needles drop from the trees this fall.

There are several older dead white fir trees scattered throughout the stand, likely remnants of fir engraver, *Scolytus ventralis*, attacks during the extended drought period during the late 1980's and early 1990's. Fir engraver continues to be active in the stand as evidenced by more recent top-kill and whole tree mortality. Additional mortality resulting from the defoliation is not expected at this time. In addition, elevated levels of fir engraver beetle activity are not expected, however some of the smaller and suppressed defoliated trees may succumb to the combined stresses. The area should be monitored next year for continued activity.

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## Sawfly Information

Sawflies have been collected on true firs since 1910 but significant levels of mortality have not been recorded as a result of outbreaks. Outbreaks have been recorded throughout the Sierra Nevada and southern Cascade ranges dating back to 1951. In the past outbreaks have occurred in dense stands dominated by white fir. In general, similar to the current outbreak on the Sierraville RD, defoliation is most pronounced in the understory trees and in the lower crowns of all trees. Occasionally 80-90% of the foliage of second growth white fir is destroyed. Active infestations may be detected readily by the fading, yellowish brown remnants of 1 year or older foliage fed upon by the larvae. After about 3 weeks, affected crowns have a lace-like silhouette, with only the midribs of needles remaining. When the remnants dry out and drop off within two to three months, new terminal foliage grows and the trees improve in appearance.

Information from previous outbreaks indicates that mortality is typically less than 1 percent and most commonly is observed in the intermediate and suppressed trees. In addition, there has not been any evidence of bark beetles or borers coming into the defoliated trees. Following an outbreak in the early 1950's on the Plumas National Forest, Struble (1957) concluded that growth reductions occurred immediately after the onset of the outbreak and there was little evidence of recovery 2 years after the outbreak ended. He indicated that foliage recovery may require five to seven years.

Emergence of adults (Fig. 1), flight, mating and oviposition occur in late fall. Typically, there is one generation per year (Fig. 2). Eggs are deposited along the edges of the needles in slits cut through the cuticle. Although eggs may be deposited in 4-year old needles, younger foliage is preferred for oviposition. The eggs are laid during late October and overwinter in that stage. Upon hatching the larvae (Fig. 3) tend to gather and feed gregariously. The larvae tend to orient themselves with their heads towards the apex of the needle when feeding. In the spring the larvae initially feed on the previous year's foliage. Feeding continues progressively into the older foliage for the full period of development. This results in the destruction of leaf tissue in various amounts (Fig 4). The larvae seldom feed on the current year's foliage. The sixth-instar larvae enter the soil just beneath the duff to form cocoons.

The white fir sawfly is attacked by many parasites and predators. Most of the natural enemies attack the larval stage. In addition, there is a naturally occurring polyhedral virus that can be important in outbreak collapse. Larvae infected with this virus become limp and flaccid, their color changes and they shrivel considerably. They cease feeding and reverse their normal orientation on the needles, with their heads pointed toward the base of the needle rather than the apex. The virus is most commonly found in later (4<sup>th</sup> and 5<sup>th</sup>) instars. Due to these natural population controls, direct suppression is typically unnecessary.

If you have any questions or request additional information please contact me at 530-252-6667.

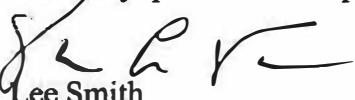
  
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Figure 1. Adults.



Figure 2. Life cycle of white-fir sawfly. (Struble, 1957)

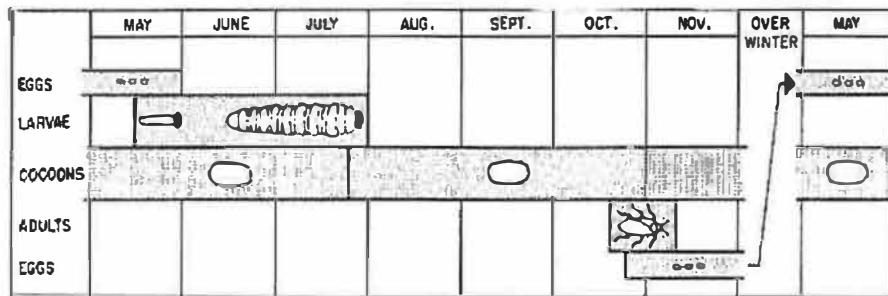


Figure 3. Larvae on white fir foliage.



Figure 4. Defoliated white fir.



# SAWFLY INFESTATION SIERRAVILLE RANGER DISTRICT TAHOE NATIONAL FOREST

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